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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,736	05/22/2006	Yukihiro Kiuchi	Q92480	7773

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EXAMINER	
FEELY, MICHAEL J	

ART UNIT	PAPER NUMBER
1796	

NOTIFICATION DATE	DELIVERY MODE
09/02/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/562,736	KIUCHI ET AL.	
	Examiner	Art Unit	
	Michael J. Feely	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 5-53* is/are pending in the application.

4a) Of the above claim(s) *20-50* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-19 and 51-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Pending Claims

Claims 1 and 5-53 are pending.

Election/Restrictions

1. Applicant's election without traverse of:

- *Group I (claims 1, 5-19, and 51-53)*;
- *The phenol resin of formula (3)*; and
- *The epoxy resin of formula (11)* in the reply filed on January 4, 2010 is acknowledged.

2. Claims 20-50 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions, there being no allowable generic or linking claim.

Election was made **without** traverse in the reply filed on January 4, 2010.

Response to Amendment

3. The objection to claims 51-53 under 37 CFR 1.75(c) has been overcome by amendment.

Claim Rejections - 35 USC § 103

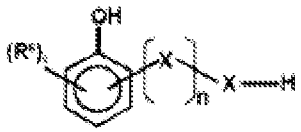
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 6, and 8-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiuchi et al. (WO 01/42360 A1 or US Pat. No. 6,730,402 B2 or US 2003/0152776 A1). Claims 51-53 are also now rejected under 35 U.S.C. 103(a) as being unpatentable over Kiuchi et al. (WO 01/42360 A1 or US Pat. No. 6,730,402 B2 or US 2003/0152776 A1). The WIPO document, US Patent, and US Publication are *equivalent documents*. Accordingly, all citations are drawn to the US Patent, which serves as a translation document for the WIPO document.

Regarding claims 1, 6, 8-19, and 51-53, Kiuchi et al. disclose: ***(1)*** an epoxy resin composition (column 3, lines 1-14; claims 27-29) comprising: an epoxy resin (A) (column 3, lines 9-14; claims 27-29) and an epoxy resin curing agent (B) (column 3, lines 4-8; claims 27-29);

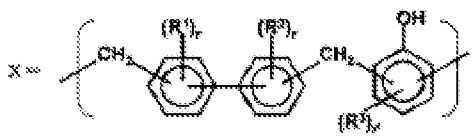
said epoxy curing agent (B) including a phenol resin (F) represented by general formula (3):



(3)

where R^6 represents hydrogen or a monovalent substituent having 1 to 3 carbon atoms, t represents an integer from 0 to 4, and n is more than 10 to less than 75 (column 9, lines 26-43; column 14, lines 58-64; claims 27-29);

wherein X is represented by the following general formula (1):



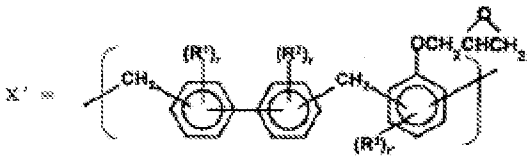
(1)

where R^1, R^2, and R^3 each independently represents hydrogen or a monovalent substituent having 1 to 3 carbon atoms, each r independently represents an integer from 0 to 4, and r' represents an integer from 0 to 3; wherein X is obtained by reaction between a phenol-based compound and a biphenyl isomer or a mixture of biphenyl isomers (see 1st & 3rd structures below columns 5 & 6);

said epoxy resin (A) includes an epoxy compound (G) represented by general formula (11):

where R^6 represents hydrogen or a monovalent substituent having 1 to 3 carbon atoms, t represents an integer from 0 to 4, and n is 0 to 10 (column 9, lines 26-43; column 10, lines 45-63; column 14, lines 58-64; claims 27-29);

where X' is represented by the following general formula (9):



where R^1, R^2, and R^3 each independently represents hydrogen or a monovalent substituent having 1 to 3 carbon atoms, each r independently represents an integer from 0 to 4, and r' represents an integer from 0 to 3; wherein X' is obtained by epoxidation of a product by reaction between a phenol-based compound and a biphenyl isomer or a mixture of biphenyl isomers (see 1st & 3rd structures in columns 11 & 12); and

further comprising an inorganic filler (C), wherein the inorganic filler (C) is aluminum hydroxide (C') (column 15, lines 16-34; claims 36 & 37);

(6) further comprising a curing promotion catalyst (D) (column 18, lines 15-36);

(8) further comprising a rubber component as a flexibilizer (column 18, lines 39-40);

(9) further comprising a silane coupling agent (column 18, lines 44-67);

(10) further comprising a mercapto compound (column 18, lines 60-61);

(11) further comprising at least one of a nitrogen-containing curing agent (column 10, lines 20-23) and an inorganic flame retardant (column 20, lines 24-35);

(12) a varnish solution comprising: an organic solvent; and the epoxy resin composition according to claim 1 or 5 which is dissolved or dispersed therein (column 20, lines 36-41; claim 38);

(13) a prepreg material comprising: a resin sheet in a semi-cured state, obtained after a process including impregnating a base material with the varnish solution according to Claim 12, followed by removal of the solvent (column 20, lines 36-44; claim 39); ***(14)*** a laminate comprising: the prepreg material according to Claim 13 (column 20, lines 44-58; claims 58-66 & 69); ***(15)*** a copper-clad laminate comprising: the prepreg material according to Claim 13; and a copper foil which is adhered to one surface thereof (column 20, lines 44-48);

(16) a copper foil provided with a resin, produced by a process comprising the step of: applying the varnish solution according to Claim 12 onto a surface of a copper foil (column 20, lines 36-48);

(17 & 51) a printed circuit board comprising: a copper foil; and a resin material laminated thereto, the resin material being only formed of an epoxy resin composition or being formed of a

base material containing an epoxy resin, said epoxy resin composition containing the epoxy resin composition according to claim 1 or 5 and being in a semi-cured state or in a cured state (column 20, lines 58-65); ***(18 & 52)*** wherein the resin material includes a prepreg material comprising a resin sheet in a semi-cured state, which is obtained after a process including the steps of: impregnating a base material with a varnish solution which contains an organic solvent and an epoxy resin composition dissolved or dispersed therein; and removing the solvent therefrom (column 20, lines 36-65); ***(19 & 53)*** wherein the resin material includes the epoxy resin composition applied on the copper foil (column 20, lines 36-65).

Kiuchi et al. fail to explicitly disclose: wherein the epoxy curing agent (B) features an n value of more than 10 to less than 75, and wherein the epoxy resin (A) features an n value of 0 to 10. Rather, they disclose: "The phenolic resin (C) *(corresponding to instant component (B))* and the epoxy resin (D) *(corresponding to instant component (A))* both contained in the flame-retardant epoxy resin composition of the present invention have *no particular restriction as to their weight average molecular weights*. The molecular weights are, for example 300 to 10,000. These weight-average molecular weights can be measured by GPC," *(see column 11, lines 58-64)*. The skilled artisan would have recognized that the instantly claimed n ranges yield molecular weight values that overlap with the disclosed weight average molecular weight range. Accordingly, it would have been obvious provide (B) and (A) with the instantly claimed n values in the composition of Kiuchi et al., so long as the (OH/Ep) ratio between these materials is greater than or equal to 0.7 and less than or equal to 2.5. This proper ratio ensures adequate crosslinking, which in turn ensures adequate flame retardance, heat resistance, and strength of the cured material *(see column 14, line 65 through column 15, line 15)*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide (B) and (A) with the instantly claimed n values in the composition of Kiuchi et al., so long as the (OH/Ep) ratio between these materials is greater than or equal to 0.7 and less than or equal to 2.5, because Kiuchi et al. disclose: (a) that these materials have no particular restriction as to their weight average molecular weight; (b) that the molecular weight ranges from 300-10,000 *(the instantly claimed n ranges yield molecular weight values that overlap this range)*; and (c) that the proper (OH/Ep) ratio ensures adequate crosslinking, which in turn ensures adequate flame retardance, heat resistance, and strength of the cured material.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kiuchi et al. (WO 01/42360 A1 or US Pat. No. 6,730,402 B2 or US 2003/0152776 A1) in view of Nakamura et al. (US Pat. No. 6,645,630).

Regarding claim 5, the teachings of Kiuchi et al. are as set forth above and incorporated herein. They fail to explicitly disclose: ***(5)*** wherein the 50 mass% average particle diameter (D_{50}) of the aluminum hydroxide (C') is 0.5 to 20 μm.

Nakamura et al. disclose a similar flame-retardant composition used for prepregs and multilayer printed wiring boards *(see Abstract; column 2, lines 10-45)*. They disclose that their aluminum hydroxide filler has an average particle diameter of greater than 0.05 microns to less than 30 microns *(preferably 5 microns)*. This particle size helps to: (a) reduce water absorption, (b) increase strength upon heating, (c) reduce dimensional change upon heating, and (d) improve transparency of the molded article *(see column 3, lines 32-51)*

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an aluminum hydroxide with the instantly claimed average particle diameter, as taught by Nakamura et al., in the composition of Kiuchi et al. because Nakamura et al. discloses that this average particle size helps to: (a) reduce water absorption, (b) increase strength upon heating, (c) reduce dimensional change upon heating, and (d) improve transparency of the molded article.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kiuchi et al. (WO 01/42360 A1 or US Pat. No. 6,730,402 B2 or US 2003/0152776 A1) in view of Takada et al. (JP 2002-241590).

Regarding claim 7, the teachings of Kiuchi et al. are as set forth above and incorporated herein. They fail to explicitly disclose: ***(7)*** further comprising one of a phenoxy resin containing an epoxy group and a phenoxy resin containing no epoxy group.

Takada et al. disclose a similar flame-retardant composition used for prepregs and multilayer printed wiring boards *(see Abstract; paragraphs 0001, 0006, and 0061)*. They disclose that the addition of a phenoxy resin is advantageous to the impregnating composition. Specifically, it allows for a good roughened surface to be acquired without having to add standard roughening ingredients. Furthermore, the phenoxy has good flame retardancy properties, and the high glass transition temperature of the phenoxy resin enhances the heat-resistance properties of the molding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the instantly claimed phenoxy resin, as taught by Takada et al., to the flame

retardant composition of Kiuchi et al. because Takada et al. disclose that the addition of a phenoxy resin: (a) allows for a good roughened surface to be acquired without having to add standard roughening ingredients; (b) enhances flame-retardance; and (c) enhances heat-resistance properties of the molding.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1, 6, and 8-19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 27-29, 36-39, 58-66, and 69 of U.S. Patent No. 6,730,402. Claims 51-53 are also now rejected. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

- The combined limitations of patented claims 27-29 and 36-39 obviously satisfy the limitations of claims 1, 12, and 13;

- The combined limitations of patented claims 58-66 and 69 obviously satisfy the limitations of claim 14;
- The limitations of claims 6, 8-11, 15-19, and 51-53 would have been obviously envisaged in light of the patent's specification *(see prior art rejection above in section 5 for specific citations) – See: In re Vogel*, 422 F.2d 438, 441-42, 164 USPQ 619, 622 (CCPA 1970); MPEP 804, II, B, 1.

10. Claim 5 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 27-29, 36-39, 58-66, and 69 of U.S. Patent No. 6,730,402 in view of Nakamura et al. (US Pat. No. 6,645,630). Claim 5 is obviously satisfied for the reasons set forth above in section 6.

11. Claim 7 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 27-29, 36-39, 58-66, and 69 of U.S. Patent No. 6,730,402 in view of Takada et al. (JP 2002-241590). Claim 7 is obviously satisfied for the reasons set forth above in section 7.

Response to Arguments

12. Applicant's arguments filed June 21, 2010 have been fully considered but they are not persuasive.

On page 21 of the response, Applicant argues that they achieve superior effects of improving heat resistance and adhesion by using the instantly claimed combination of high molecular weight phenol resin ($10<n<75$) and low molecular weight epoxy resin ($0\leq n\leq 10$). Specifically, they point to the results in Table 4 *(see Examples 1 & 2 and Comparative Examples*

1 & 2). Applicant also contends that: "both of the phenol resin *(F)* and the epoxy resin *(A)* in Kiuchi et al. has a low molecular weight, such as 300 to 10,000 (US 6,730,402, col. 14, lines 58-62) in which each of the numbers of repetition (n) of the phenol *(F)* and the epoxy resin *(A)* is $0 \leq n \leq 10$." The Office respectfully disagrees.

It is important to note that the elected species of phenol resin corresponds to Applicants' specific structure (47) *(see Examples: F1, F2, F1',F2')*. Phenol resins corresponding to Applicants' structure are also taught by Kiuchi et al. *(see first structure below columns 5 & 6)*. It is also important to note that the elected species of epoxy resin corresponds to Applicants' specific structure (45) *(see Examples: G1, H1)*. Epoxy resins corresponding to Applicants' structure are also taught by Kiuchi et al. *(see first structure in columns 11 & 12)*.

- Applicants' assertion that both the phenol resin and the epoxy resin of Kiuchi et al. correspond to an n value of $0 \leq n \leq 10$, is incorrect:

For the noted phenol resin having a molecular weight range of 300 to 10,000, the n value would range from approximately 0 to approximately 35; and for the noted epoxy resin having a molecular weight range of 300 to 10,000, the n value would range from approximately 0 to approximately 29. Accordingly, the teachings of Kiuchi et al. suggest: (a) phenol resins within the claimed range and below the claimed range; and (b) epoxy resins within the claimed range and above the claimed range. This would yield the following possible combinations:

  - (1) a phenol resin within the claimed range & an epoxy resin within the claimed range, which corresponds to Applicants' Examples 1 & 2, yielding their desired property set of Tg, Adhesion to copper foil, Flame retardance, and Solder heat resistance *(see Table 4)*;

- (2) a phenol resin within the claimed range & an epoxy resin above the claimed range, which corresponds to Applicants' Comparative Examples 5 & 6, yielding a relatively lower Tg and Adhesion to copper foil *(see Table 5)*;
- (3) a phenol resin below the claimed range & an epoxy resin within the claimed range, which corresponds to Applicants' Comparative Examples 1 & 2, yielding a relatively lower Tg and Adhesion to copper foil *(see Table 4)*; and
- (4) a phenol resin below the claimed range & an epoxy resin above the claimed range, which corresponds to Applicants' Examples 6 & 7, yielding their desired property set of Tg, Adhesion to copper foil, Flame retardance, and Solder heat resistance *(see Table 5)*.

As set forth above, the improved *(and alleged unexpected)* results are not limited to the instantly claimed combination of ranges, as set forth in the elected embodiment. Accordingly, the data fails to demonstrate criticality for the instantly claimed combination of ranges, as set forth in the elected embodiment.

- The data features a limited number of data points.

The pertinent examples *(see discussion above)* feature: one epoxy compound within the claimed range *(see G1 with a Mw of 1200)*; and one epoxy compound above the claimed range *(see H1 with a Mw of 15000)*. Epoxy G1, alone, is not representative of all the Mw embodiments within the claimed range; and Epoxy H1, alone, is not representative of all the Mw embodiments above the claimed range. Furthermore, these epoxy resins fail to isolate the alleged critical endpoint of the claimed range by showing results at, just above, and just below an n value of 10.

The pertinent examples feature: two phenol resins within the claimed range *(see F1 with a Mw of 13100 & F2 with a Mw of 3200)*; two phenol resin below the claimed range *(see F'1 with a Mw of 850 & F'2 with a Mw of 1400)*; and no phenol resins above the claimed range. Phenols F1 & F2 are not representative of all the Mw embodiments within the claimed range; phenols F'1 & F'2 are not representative of all the Mw embodiments below the claimed range; and there is no data representative of the Mw embodiments above the claimed range. Furthermore, these phenol resins fail to isolate the alleged critical endpoints of the claimed ranges by showing results just above and just below n values of 10 and 75.

- The claims are not commensurate in scope with the data.

The instant claims require an epoxy resin (A), a phenol resin (F), and an inorganic filler (aluminum hydroxide) (C); and they are open to any other materials *(see comprising)*. In addition to the claimed components (A), (F), and (C), the alleged unexpected results are generated with 0.045 phr of a specific imdazole derivative *(curing promotion catalyst)* and 0.10 phr of a specific aminosilane *(coupling agent)*. Furthermore, it appears that 20 to 45 percent by mass of (C) relative to the total amount of (A), (B), and (C), is required to achieve the desired set of performance properties *(see page 61 of the specification; paragraph 0145 of the corresponding pre-publication)*.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is (571)272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael J Feely/
Primary Examiner, Art Unit 1796

August 27, 2010